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Multidisciplinarity and new perspectives in horse welfare assessment

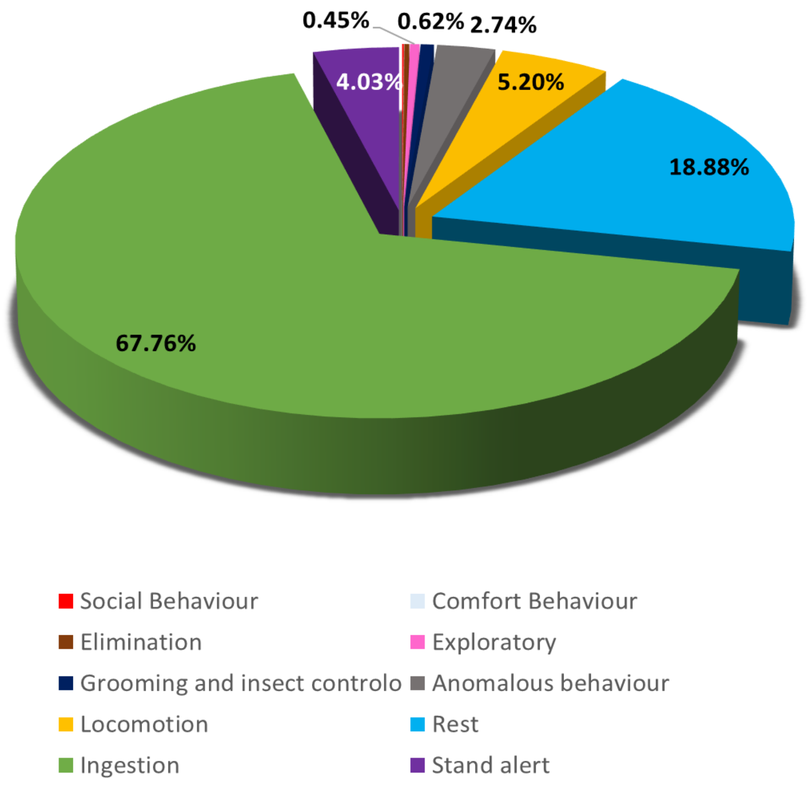
PART 1: Evaluation of Horses' Daytime Activity Budget in a Model of Ethological Stable: A Case Study in Italy

Objective: Different kinds of horse management and housing systems have been developed, following increasing interest in horse behavioural and physiological needs to ensure high standards of welfare. This research analyzes a new type of stable (**ETHOLOGICAL STABLE**), and measures the daytime activity budget of the resident horses.

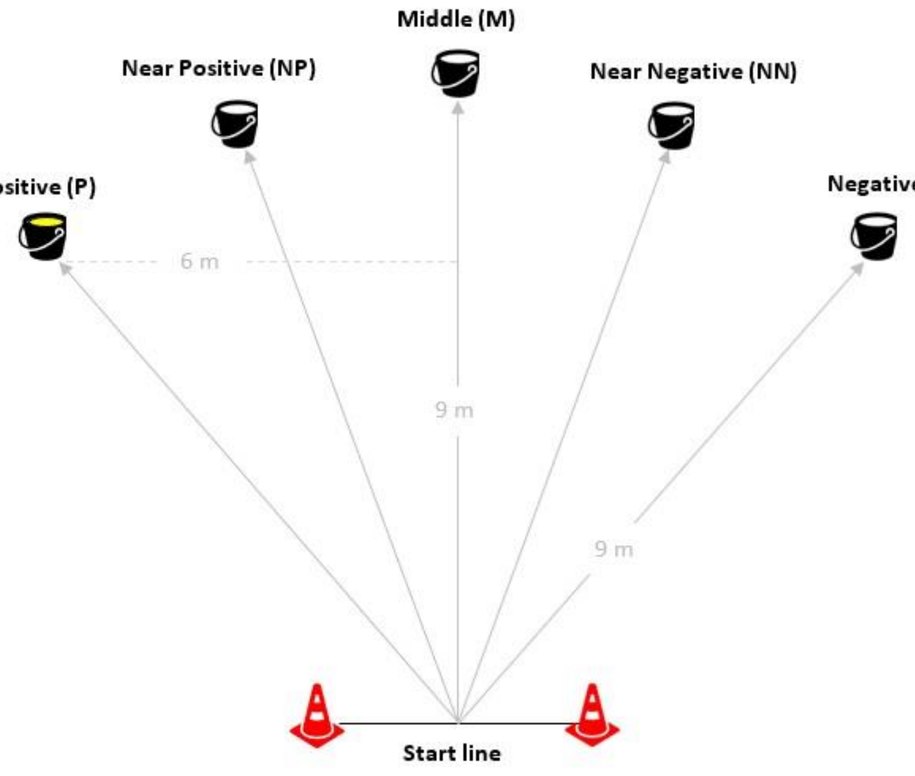
M&M: Behavioral sampling-Focal animal sampling; Number of animals-5; Total observations-9920 minutes; Where-in the paddock and inside the Big Box ©

Results: Horses spent most of the daytime (7.00 am-9.00 pm) in ingestion behaviors (67.76%±2.51%), followed by resting behaviors (18.88%±2.12%), and locomotion (5.20%±0.51%). Social behaviors (s.e. allogrooming) were rare (<0.06%), and the stereotypic behaviors occupied 2.74%±2.74%.

Conclusion: The percentage of ingesting, resting and locomoting behaviors is similar to what is reported for free-roaming feral horses. This can be considered a positive aspect for horse welfare. However, the rare occurrence of positive social interactions and the presence of some stereotypies could be aspects to ameliorate. The Ethological Stable tries to take into account the behavioural needs of horses and could be an alternative to the traditional management.



PART 2: Is the judgment bias test a good tool to assess the quality of horse management?



Objective: Decision-making process, assessed using JBT (Judgement bias test), is increasingly employed in emotional evaluation. The response of animals in front of ambiguous cues can be influenced by their affective state (optimistic or pessimistic). This second research aims to investigate the relationship between a spatial JBT and the chronic and acute activation of HPA (hypothalamic-pituitary adrenal) axis in horses hosted in different kinds of management: traditional stables (TS), natural boarding (NB), and ethological stable (ES).

M&M: 20 out of 41 horses learned to discriminate between a Negative (N- non rewarded) and a Positive (P-rewarded) position. Then, the latency to reach intermediate positions (Near negative-NN, Near positive-NP and Middle-M) was measured. Fecal cortisol concentration during the JBT and horsehair cortisol level were measured using RIA (Radio Immuno Assay). BCS (Body Condition Score) and personality traits (HPQ-Horse Personality Questionnaire) were evaluated.

Results: 1) ES group registered a significantly lower score in NN, suggesting a more optimistic affective state, but the number of horses was low; 2)there was a significantly higher probability that horses with P location on their left were excluded from the test ($\chi 2 = 5.47, df=1$, p-value=0.02); 3) horses from NB recorded higher fecal cortisol concentration than TS subjects ($p<0.05$), but lower horsehair cortisol levels ($p<0.01$), which could suggest a generally lower level of chronic stress.

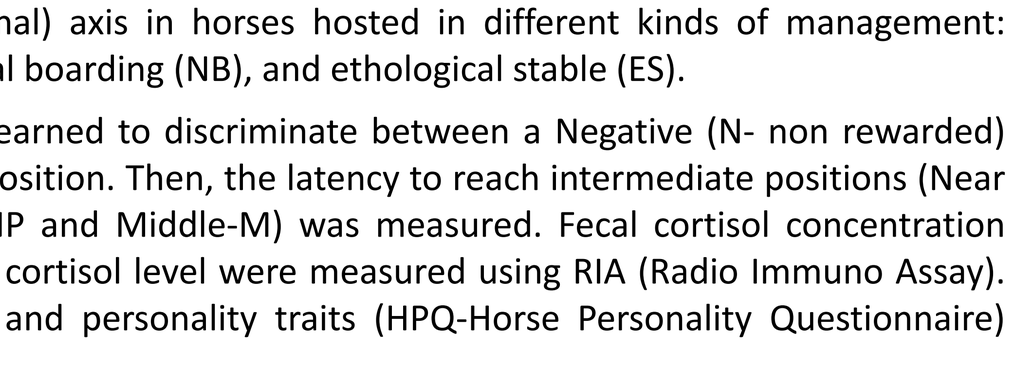
Conclusion: Our results evidence some criticism in the use of JBT as a tool for the monitoring of the quality of the management (possible influence of acute stress and of the test structure). Due to these confounding factors, this procedure should be accompanied by other indicators.

PART 3: Limitations of spatial judgment bias test application in horses (*Equus ferus caballus*)

Objective: The aim of the third study was to deepen the findings of the PART2, investigating how the spatial structure of the JBT, personality traits and chronic and acute stress could potentially influence JBT in the same management condition.

M&M: 14 out of 16 horses of a traditional stable were included in JBT. The JBT and cortisol assessment methods from feces and horsehair were the same of the previous study. Furthermore, we assessed personality traits using the E-BARQ, and we recorded the frequency of behavioral stress indicators

Results: Horses with P at the right approach faster NN. No difference in latency to reach P and ambiguous location was found, but there was between NN and NP and M (the value associated with P and N can change the animal's decision of taking a risk: lack of a reward in N is not so costly for the individual that decides to respond positively also in front of a potential negative cue). Some personality traits, such as human social confidence, influence the latency to M and NP, but chronic and acute stress conditions did not seem to affect horses' judgment bias. In this case the JBT did not influence acute stress behavioural and endocrinological parameters. Similarly to the previous study, horsehair cortisol concentration did not predict JBT results.



Conclusion: There are some limitations in the employment of spatial judgment bias tests in horses, and probably personality traits can partially influence the cognitive process. The use of this kind of test in horses should consider the peculiarities of both species and individuals.